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## ARTICLE XVI.

*Notice of the Oolitic Formation in America, with Descriptions of some of its Organic Remains. By Isaac Lea. Read May 15, 1840.*

BARON HUMBOLDT, in his "Geognostical Essay on the Superposition of Rocks in both Hemispheres," mentions having met with the Jura Formation (Oolite of English geologists) in Venezuela and other districts of Colombia, as well as at Zacatecas, in Mexico; but I am not aware of any organic exuviae having been described from this formation in the western hemisphere.

Some years since, my friend, Dr. Gibbon, was appointed to attend a public mission to Bogota, and, at my solicitation, kindly undertook to collect such specimens in geology and zoology as he should think might interest me. Among many other objects brought by him, I was very much surprised to find several specimens of well characterized fossils of the Oolitic series, not being then aware of any one having observed any part of that geological epoch in our hemisphere. Other more pressing occupations have caused me to defer the final examination of these interesting specimens until recently. On comparison with the fossils of the Oolite in my cabinet, from England, I find the mass possessing the same mineralogical characters, being argillo-calcareous, accompanied, occasionally, by sulphuret of iron, and the organic forms to be of the same genera. The well known genus *Trigonia* presents several species, one of which has a close resemblance to *Trigonia clavellata*, which, in Europe, is distributed through many different beds of this group. The *Ammonites*,

also, seem to prevail, as in the mass of the same period in England, there being at least five species among the few specimens brought by Dr. Gibbon.

The extent of this formation in Columbia was not observed by Dr. Gibbon, nor were any observations made as regards the dip of the strata, or its direction. The labels accompanying the specimens stated that they were taken up in the road between Popoyan and Bogota, chiefly between La Messa and Tocaima. Specimens thus collected could scarcely be expected to be found perfect, and it is to be regretted that these are not better characterized. Such as they are, I have ventured to describe them, with a hope of drawing the attention of some geologist who may pass through that country and observe the deposit with attention. The mineralogical character of the specimens are very uniform, consisting of a dark slate-coloured argillaceous carbonate of lime, occasionally accompanied by crystallized sulphuret of iron.

In these few imperfect specimens we have an illustration of the importance, nay, the absolute necessity, of a knowledge of the geo-zoological characteristics to establish the age of the masses after a certain period. Zoological evidence is the unerring guide to designate the different epochs. The importance of this is established in a paper on the Age of the Limestones of South Devon, recently read by Mr. Lonsdale before the Geological Society of London. In this paper we are informed that Captain Smee and Captain Grant had recently brought to England, from Cutch, and the desert east of it, suites of fossils from "a series of beds unquestionably of the age of the Oolites of England, the fossils agreeing, in their general characters, with those of that geological epoch" in that country, and "being, in many instances, specifically undistinguishable;" thus establishing the fact of the deposits of the Oolitic period being immensely extended, and proving, with the specimens now produced, that the unity of the zoological existence of that period extended nearly, if not entirely round the globe.\*

In Dr. Troost's Fifth Geological Report to the Legislature of Tennessee (p. 6) he mentions a limestone of "an *Oolitic* structure" as existing near the Cumberland Mountains. He states that the Oolite of the English geologists is of "a more recent group," and that his Oolitic limestone is invariably found

\* Professor Vanuxem informed me recently that he picked up, some years since, a fossil *Trigonia* near the ruin of a building in the city of Mexico. It had evidently been part of the structure, and probably carried from some distance, as the rock over which the city is built is entirely volcanic.

beneath the coal strata. It is characterized by *Pentremites*, a fossil which has not been, I believe, observed above the carboniferous limestone.\*

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**ORTHOcera HUMBOLDTIANA.** Plate VIII., Fig. 1.

*Testâ rectâ, elongato-conicâ, subcylindraceâ; articulis transversis, subdistantibus.*

Shell straight, elongately conical, nearly cylindrical; joints transverse, rather distant.

Found in the Province of Velez, New Granada. Dr. Gibbon.  
My Cabinet.

*Remarks.*—Unfortunately, I received only an imperfect fragment of this *Orthocera*. It is important in connexion with these fossils, as it proves them to belong to the lower series of the Oolitic group. De la Beche mentions one only, *O. elongatum*, as being found in the Oolitic group, and that in its lowest member, the Lias, while below that, as far down as the Transition Limestone, they are common. I propose the name of the distinguished American traveller for this species.

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**AMMONITES TOCAIMAENSIS.** Plate VIII., Fig. 2.

*Testâ orbiculari; aufractibus planulatis, transversim costulatis; costis planulatis; periphæriâ minutè sulcatâ.*

Shell orbicular; whorls flattened, transversely ribbed; ribs flattened; periphery minutely furrowed.

Found on the top of a mountain between Tocaima and La Messa, in New Granada. Dr. Gibbon.

My Cabinet.

\* Since the completion of this paper I have received the beautiful work of Von Buch on some of the fossils taken to Europe by Humboldt, from New Granada. I owe to the kindness of the author the opportune acquisition of this volume. His *Trigonia alæformis* may be identical with *T. Tocaimaana* (nobis.) In other cases the specific forms seem to differ.

Von Buch takes a different view from Humboldt as regards the age of these organic remains, placing them rather higher, and in the chalk formation. They certainly do not resemble the forms common to our chalk fossils, nor do they seem to me to be allied to those of England, so far as I am acquainted with them. Notwithstanding the arguments deduced by the author, I still am of opinion that the fossils brought by Dr. Gibbon from New Granada, and herein described, are properly members of the Oolitic group.

*Remarks.*—A small portion only of a whorl of this species was received. It differs from *A. Gibbonianus* in being more flattened, and in having a very minute furrow, being little more than a mere impressed line.

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AMMONITES GIBBONIANUS. Plate VIII., Fig. 3.

*Testâ orbiculari; aufractibus compressis; costis elevatis, carinatis, remotiusculis ad periphæriam.*

Shell orbicular; whorls compressed; ribs elevated, carinate, somewhat distant at the periphery.

Found between Tocaima and La Messa, New Granada. Dr. Gibbon.  
My Cabinet.

*Remarks.*—A small section only of this large species was brought by Dr. Gibbon, after whom it is named. The few characters which can be seized in such a specimen render a description very meager and doubtful.

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AMMONITES OCCIDENTALIS. Plate VIII., Fig. 4.

*Testâ orbiculari, utrinque umbilicatâ; aufractibus rotundatis, transversim costulatis; periphæriâ rotundâ, sulco circulari destitutâ.*

Shell orbicular, umbilicate on both sides; whorls round, transversely ribbed; periphery round, being destitute of a circular furrow.

Found in the Province of Velez, New Granada. Dr. Gibbon.  
My Cabinet.

*Remarks.*—A single imperfect specimen only was brought by Dr. Gibbon. One of the chambers has been removed without injury to the other parts. It is destitute of a carina and furrow.

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AMMONITES VANUXEMENSIS. Plate VIII., Fig. 5.

*Testâ orbiculari, utrinque umbilicatâ; aufractibus convexo-cylindricis, transversim crebrissimèque costulatis; periphæriâ rotundâ, sulco circulari destitutâ.*

Shell orbicular, umbilicate on both sides; whorls convexly cylindrical, transversely and thickly ribbed; periphery round, being destitute of a circular furrow.

Found in the Province of Velez, New Granada. Dr. Gibbon.  
My Cabinet.

*Remarks.*—A small species with numerous ribs, which are alternately duplicated on the outer part of the whorl. It is destitute of a carina and furrow. I name it after my friend Professor Vanuxem, the distinguished geologist.

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### AMMONITES AMERICANUS. Plate VIII., Fig. 6.

*Testâ orbiculari; aufractibus subplanis, obliquè costulatis; periphæriâ sulcatâ.*

Shell orbicular; whorls somewhat flattened, obliquely ribbed; periphery furrowed.

Found on the mountains between Tocaima and La Messa, in New Granada. Dr. Gibbon.

My Cabinet.

*Remarks.*—A portion only of a single whorl of this species is before me, and the description is necessarily imperfect. It is distinct from the other species which accompanied it, in being furrowed. The furrow is not very distinct, and an imperfect carina seems to be connected with it.

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### TRIGONIA GIBBONIANA. Plate IX., Fig. 7.

*Testâ ovato-trigonâ, multicostatâ; costis transversis, sub tuberculato-asperis; areâ carinatâ.*

Shell ovately triangular, many ribbed; ribs transverse, somewhat roughly tuberculate; posterior slope carinate.

Province of Velez, New Granada. Dr. Gibbon.

My Cabinet.

Diam. 1.5,

Length 2,

Breadth 2 inches.

*Remarks.*—In outline and size this species resembles Parkinson's figure of *T. spinosa*, (Vol. III., Pl. XII., Fig. 7,) which is described by Lamarck as *T. scabra*. Neither of the two specimens in my possession are very perfect. The tubercles on the ribs of the larger and broken specimen are more observable. In these tubercles it has some resemblance to *T. dædalæa*, Sow. and Park.

**TRIGONIA TOCAIMAANA. Plate IX., Fig. 8.**

*Testâ trigonâ, posticê productâ, inflatâ; costis transversis, lævibus.*

Shell triangular, produced behind, inflated; ribs transverse and smooth.

Found between Tocaima and La Messa, New Granada. Dr. Gibbon.

My Cabinet.

Diam. 1.5,

Breadth 1.3 inches.

*Remarks.*—Both the specimens received of this species were, unfortunately, quite imperfect. In both, the posterior angle is deficient. Judging from the curves of the margin, I presume that this species is produced like the *T. aliformis*. (Parkinson, Pl. XII., Fig. 9.) It resembles it, also, in outline, and in the position and direction of the ribs.

**TRIGONIA HONDAANA. Plate IX., Fig. 9.**

*Testâ ovato-trigonâ, inflatâ, multicostatâ; costis transversis, tuberculato-nodosis; areâ posticâ elevatâ, crebrissimâ nodosâ.*

Shell ovately triangular, inflated, with many ribs; ribs transverse, furnished with tubercles; posterior slope elevated, with numerous tubercles.

Found between Guaderus and Honda, New Granada. Dr. Gibbon.

My Cabinet.

Diam. 2.3,

Length 3.3,

Breadth 3.2 inches.

*Remarks.*—This is larger than any species which has come under my notice. A single, rather imperfect, specimen only was brought by Dr. Gibbon. In its general outline and appearance it resembles *T. Gibboniana*, herein described, and may prove to be only an old and very large individual of that species.

**NATICA GIBBONIANA. Plate IX., Fig. 10.**

*Testâ ovatâ, ventricosâ; spirâ productiusculâ; aufractibus quinis, subplanulatis; aperturâ contractâ, elongatâ.*

Shell ovate, inflated; spire rather produced; whorls five, rather flattened; aperture contracted, elongate.

Found on the top of a mountain between Tocaima and La Messa, in New Granada. Dr. Gibbon.

My Cabinet.

Diam. 1.3,

Length 1.5 inches.

*Remarks.*—This is the only spiral species brought by Dr. Gibbon among the fossils from Colombia. It is the more interesting, as the Oolitic formation is the first in which this genus appears in Europe. Mr. Smith, in his “Strata Identified,” figures, on his plate of the “Coral Rag and Pisolite,” an *Ampullaria*, (Fig. 2,) which resembles, in form, this *Natica*; and I think that De la Beche means this when he quotes *Natica arguta*., Smith, as existing in the Coral Rag, as Woodward does also.

### SPATANGUS COLOMBIANUS. Plate IX., Fig. 11.

*Sp. ovato-cordatus, gibbus, convexus, anticè planulato; ambulacris quinque, lanceolatis, transversim punctatis.*

Sp. ovately cordate, gibbous, convex, flattened before; ambulacra five, lanceolate, transversely punctured.

Found in the mountains between Tocaima and La Messa, New Granada. Dr. Gibbon.

My Cabinet.

Height .9,

Length 1.4,

Breadth 1.3 inches.

*Remarks.*—A single specimen only was received, and it seems to be different from any which has been described.

## THE OOLITE OF CUBA.

Within a few years I have received specimens of organic remains from two friends in Cuba. On examination I found part of them to belong to the Oolitic group, and, most probably, to the higher members of it. Those from near



Havanna were from Mons. Poey, under whose charge the Botanic Garden has been placed; those from Matanzas were from my friend Louis Vanuxem, Esq., and are from deposits of a more recent formation, being of a white limestone.

It is evident that Baron Humboldt had this formation in his mind in making the following observations:—"I thought I recognised in the equinoctial zone of America the Jura formation in several whitish limestones, partly lithographic, with a fracture smooth and dull, or very flat conchoidal. These are the limestones of the cavern of Caripe, (S. E. of Cumana,) the shore of Nueva Barcelona, (Venezuela,) the Isle of Cuba, (between the Havanna and Batabano; between Trinidad and the boca del Rio Guaurabo,) and the central mountains of Mexico, (plains of Salamanca and the defile of Batas.)"

The specimens now described and figured are not all from the same group, and with so small a number it would be difficult, if not impossible, to arrange them correctly in their exact superposition. These are, however, sufficient to confirm the impression of the distinguished traveller that the Jura formation (Oolite) existed in Cuba. In another paper I have shown that the lower members of the Oolitic group are identified in New Granada. Future observations, with more extended means than a few specimens of a small number of species affords, will, I have little doubt, enable the geologist to make out the whole Oolitic group in America to be similar in its characters to that of Europe. In the few specimens under examination it will be perceived that the generic forms coincide with those found in the Oolite of England; and it is a matter of doubt with me if the specific characters of some be not identically the same. Thus the *Terebratula*, which I propose to call *Cubaensis*, seems to me so closely to resemble a *Terebratula* of which I have specimens from Dundry, in England, that I should not now propose a separate place for it, but that it may be the more readily distinguished and referred to. The fracture of a *Belemnite* among the specimens received presents no characters which can be observed different from those of the Oolite of England, and, therefore, will not be farther noticed.

De la Beche on the Geology of Jamaica (Geol. Soc. Trans., Vol. II., New Series) mentions a "compact white limestone formation" containing "organic remains, generally casts," which he places, with some doubt, with the "Superior, or Tertiary Rocks." Among the forms, he gives, in his list, the *Nautilus*,

*Cerethium*, *Terebratula*, &c. From the white limestone of Matanzas I have some of the same generic forms, and have no doubt of their common origin.

In regard to this white limestone, I should agree with De la Beche, certainly, in not placing it below the Tertiary period. At the same time, we must not confound the rock containing these "casts" with the rocks containing the shells of the genera *Terebratula*, &c. These latter are, I think, of a different origin.

For the casts in my possession I propose the following names:—

*Nautilus Cubaensis*. Plate X., Fig. 15. Cast of the chamber.

*Arca Sillimaniana*. Plate X., Fig. 16.

*Cucullea dubia*. Plate X., Fig. 17.

*Chama tortuosa*. Plate X., Fig. 18.

*Cardium globosum*. Plate X., Fig. 20.

" *depressum*. Plate X., Fig. 21.

*Conus. latus*. Plate X., Fig. 19.

### TEREBRATULA TAYLORIANA. Plate X., Fig. 12.

*Testâ triangulari, sulcis longitudinalibus impressis; valvâ inferiore in superiorem reflexâ; margine buplicato.*

Shell triangular, with impressed longitudinal furrows; the inferior valve reflected into the superior one; margin doubly folded.

Found near Havanna, Cuba. Mons. Poey.

My Cabinet.

Diam. .7,

Length 1,

Breadth 1.2 inches.

*Remarks*.—This is an interesting species, and so much like one (name unknown to me) which I have from the Oolite of Dundry, England, that it can scarce be said to differ from it. It seems, however, to be a larger species, and the great flexure of the margin is more oblique. The very bad figure, Pl. VIII., Fig. 15, of Young's "Geological Survey of the Yorkshire Coast," has some resemblance to it. As, also, Dr. Fitton's fine figure of *Terebratula convexa*. "Strata Below the Chalk," Pl. XIV., Fig. 12. I name this after R C. Taylor, Esq., the Geologist.

**TEREBRATULA POEYANA. Plate X., Fig. 13.**

*Testâ elongato-ovatâ, lævi, inflatâ; nate productâ, incurvâ; foramine submagno.*

Shell ovately lengthened, smooth, inflated; beak produced, incurved; hole rather large.

Found near Havanna, Cuba. Mons. Poey,  
My Cabinet.

Diam. .6,                      Length 1.1,                      Breadth .8 inches.

*Remarks.*—This species very much resembles some of the species of the Green Sand of New Jersey, as well as of the same deposit in England. Dr. Fitton's figure of *Terebratula prælonga*, Pl. XIV., Fig. 14, "Strata Below the Chalk," is somewhat like this shell, but it is longer, and has a furrow which does not exist in the *Poeyana*.

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**TELLINITES HUMBOLDTIANA. Plate X., Fig. 14.**

*Testâ scaleniâ, inflatâ, anticè truncatâ; striis transversis, elevatis, remotiusculus, rotundatis.*

Shell scaleniform, inflated, truncate before; striæ transverse, raised, somewhat remote, rounded.

Found near Havanna, Cuba. Mons. Poey.  
My Cabinet.

Diam. .7,                      Length .7,                      Breadth 1.1 inch.

*Remarks.*—This shell resembles very closely the *Tellinites problematicus*, *Schlottheim*, from Solenhofen; and they may both, perhaps, belong to the same period.